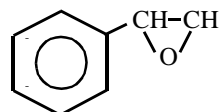


STYRENE OXIDE

Styrene oxide is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Formula: 96-09-3

Molecular Formula: C_8H_7O



Styrene oxide is a colorless to pale straw-colored liquid with a sweet, pleasant odor. It is soluble in alcohol and ether, and miscible with benzene, acetone, methanol, carbon tetrachloride and most organic solvents. Styrene oxide reacts vigorously with compounds having labile hydrogen, including water, in the presence of catalysts (such as acids, bases, and certain salts) (HSDB, 1991).

Physical Properties of Styrene Oxide

Synonyms: 1,2-epoxyethylbenzene; epoxystyrene; phenethylene oxide; phenyloxirane; styryl oxide

Molecular Weight:	120.15
Boiling Point:	194.1 °C
Melting Point:	-35.6 °C
Vapor Density:	4.30 (air = 1)
Vapor Pressure:	0.3 mm Hg at 20 °C
Density/Specific Gravity:	1.0523 at 16/4 °C (water = 1)
Flashpoint:	82.2 °C
Conversion Factor:	1 ppm = 4.91 mg/m ³

(HSDB, 1991; Sax, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Styrene oxide is primarily used as a chemical intermediate in the production of styrene glycol and its derivatives. It is also used as a reactive diluent for epoxy resins and as a chemical intermediate for cosmetics, surface coatings, treatment of fibers and textiles, and agricultural and biological chemicals (HSDB, 1991).

In California, emissions for styrene oxide and styrene were reported together. The primary stationary sources include plastic material and resin facilities, plastic product facilities, and manufacturers of synthetics (ARB, 1997b).

B. Emissions

The total emissions of styrene and styrene oxide from stationary sources in California are estimated to be at least 2.5 million pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Styrene oxide has been identified as a volatile component of Burley tobacco (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of styrene oxide.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of styrene oxide was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Styrene oxide will exist in the gas phase in the atmosphere, and will react with the hydroxyl radical. No information is available concerning the rate constant for this reaction (Atkinson, 1995). No information about the atmospheric half-life or lifetime of styrene oxide was found in the readily-available literature.

AB 2588 RISK ASSESSMENT INFORMATION

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics “Hot Spots” Program (AB 2588). Of the risk assessments reviewed as of April 1995, styrene oxide did not contribute to the total cancer risk in any of the risk assessments reporting a total cancer risk greater than or equal to 1 in 1 million (OEHHA, 1995).

HEALTH EFFECTS

Probable routes of human exposure to styrene oxide are inhalation, ingestion, and dermal contact (Sittig, 1991).

Non-Cancer: Exposure to styrene oxide may cause skin, eyes, nose, and throat irritation. Styrene oxide is a central nervous system depressant and is associated with the generation of liver lesions in animals following acute oral exposure (HSDB, 1993; Sittig, 1991).

The United States Environmental Protection Agency (U.S. EPA) has not established a Reference Concentration (RfC) or an oral Reference Dose (RfD) for styrene oxide (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of styrene oxide in humans. Animals exposed to styrene oxide via inhalation showed maternal toxicity and increased fetal mortality (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of styrene oxide in humans. An increased incidence of squamous-cell carcinomas and papillomas of the forestomach in rats and mice exposed orally and via gavage have been reported in several studies. The U.S. EPA has not classified styrene oxide with respect to potential carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified styrene oxide in Group 2A: Probable human carcinogen (IARC, 1987a).

The State of California has determined under Proposition 65 that styrene oxide is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is 4.6×10^{-5} (microgram per cubic meter)⁻¹ (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 microgram per cubic meter of styrene oxide is estimated to be no greater than 46 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 1.6×10^{-1} (milligram per kilogram per day)⁻¹ (OEHHA, 1994).

